

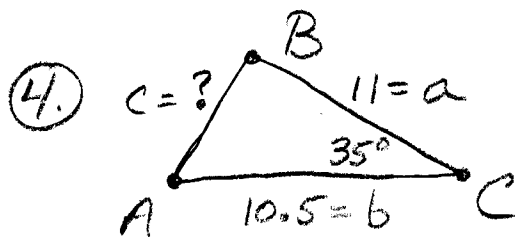
BE - Alg 2

Friday 1-20-12

* Homework review

Pg 736 # 4, 11, 17

Homework Review - Pg 736 # 4, 11, 17



SAS \Rightarrow 2 SIDES \Rightarrow Lot C

Find c first, sides to nearest tenth, angles to nearest degree.

$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$c^2 = 11^2 + 10.5^2 - 2(11)(10.5) \cos 35^\circ$$

$$c^2 = 121 + 110.25 - 231(.8192)$$

$$c^2 = 231.25 - 189.24$$

$$c^2 = 42.01$$

$$c = \sqrt{42.01} \approx 6.48 = \boxed{6.5 = c}$$

Find $A \Rightarrow \frac{\sin A}{11} = \frac{\sin 35^\circ}{6.48} \therefore \sin A = 11 \left(\frac{\sin 35^\circ}{6.48} \right)$

↑
(DO NOT USE THE
ROUNDED 6.5!)

$$\sin A = 11 \left(\frac{.5736}{6.48} \right)$$

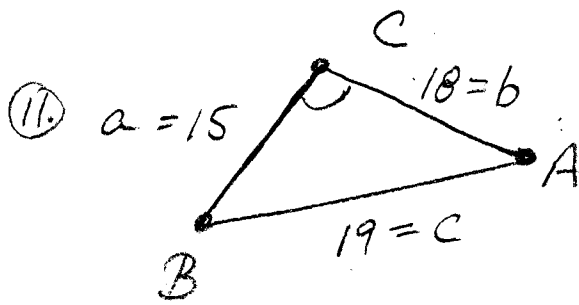
$$\sin A = 11(.0885)$$

$$\sin A = .9735$$

$$A = \sin^{-1}(.9735)$$

$$A = 76.8 \therefore \boxed{77^\circ A}$$

$$\therefore B = 180 - 77 - 35 = \boxed{68^\circ = B}$$



LOOK

* Tip: find biggest angle \Rightarrow angle C first \Rightarrow

$$c^2 = a^2 + b^2 - 2ab \cos C \quad \leftarrow \text{Get "By itself"}$$

$$19^2 = 15^2 + 18^2 - 2(15)(18) \cos C$$

$$361 = 225 + 324 - 540 \cos C$$

$$361 = 549 - 540 \cos C$$

$$\frac{-108}{-540} = \frac{-540 \cos C}{-540}$$

$$.3481 = \cos C \quad \therefore C = \cos^{-1}(.3481) = 69.6^\circ$$

$$\therefore \boxed{C = 70^\circ}$$

Find middle side's opposite angle B \Rightarrow

$$\frac{\sin B}{18} = \frac{\sin 70}{19} \quad \therefore \sin B = \frac{18 \sin 70}{19}$$

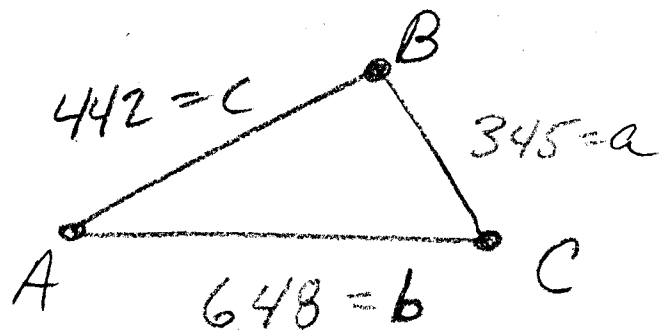
$$\sin B = \frac{18(.9397)}{19} = .8902$$

$$\sin^{-1}(.8902) = \boxed{62.9^\circ = 63^\circ = B}$$

$$\therefore C = 180 - 69.6 - 62.9$$

$$\boxed{C = 47.5 = 48^\circ}$$

(17) $a = 345$
 $b = 648$
 $c = 442$



LOOK * Find biggest side first

$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$648^2 = 345^2 + 442^2 - 2(345)(442) \cos B$$

$$419904 = 119025 + 195364 - 304980 \cos B$$

$$419904 = 314389 - 304980 \cos B$$

$$105515 = -304980 \cos B$$

$$-0.3460 = \cos B \quad \therefore \cos^{-1}(-.3460) = 110.2^\circ$$

Find "middle sides" opposite angle $\Rightarrow C = \boxed{110^\circ = B}$

$$\frac{\sin C}{442} = \frac{\sin 110}{648} \quad \therefore \sin C = \frac{442(\sin 110)}{648}$$

$$= .6821 (.9397)$$

$$\sin C = .6410$$

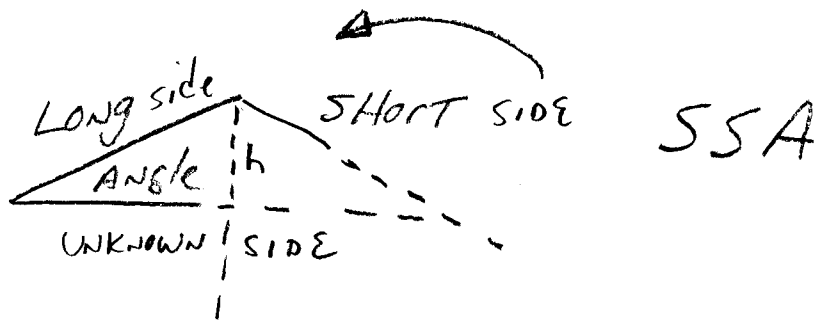
$$C = \sin^{-1}(.6410)$$

$$C = 39.9^\circ = \boxed{40^\circ = C}$$

$$A \Rightarrow 180 - 110.2 - 39.9 = 29.2$$

$$\boxed{A = 30^\circ}$$

If you know two sides
and one angle, and the
angle is opposite the short
side



There may be NONE, ONE, or two
possible solutions.

The LAW of Cosines RESULTS in
A QUADRATIC WITH Δ positive,
1 positive, or 2 positive solutions.

Law of Sines = not recommended for SSA - must memorize the
table on next page if you want to use it!! - not recommended.

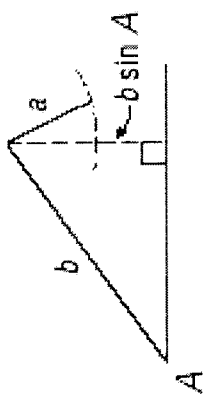
(see 727 & 728 if you want to)
use the LAW of Sines
* called the Ambiguous case of the LOS

Key Concept

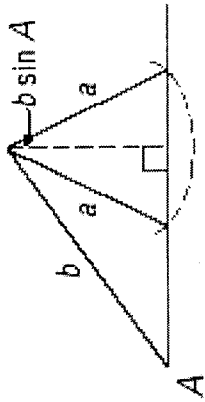
Possible Triangles Given Two Sides and One Opposite Angle

Suppose you are given a , b , and A for a triangle.

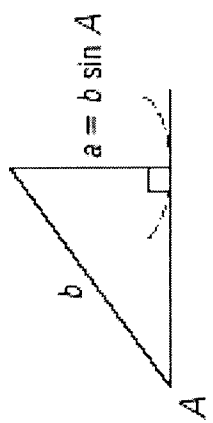
A Is Acute ($A < 90^\circ$).



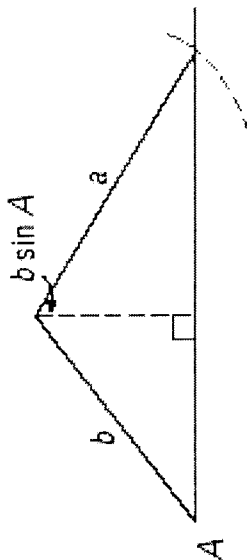
$a < b \sin A$
no solution



$b > a > b \sin A$
two solutions

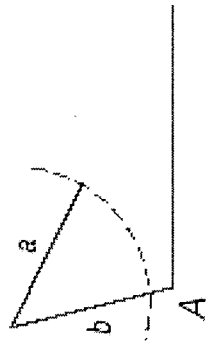


$a = b \sin A$
one solution

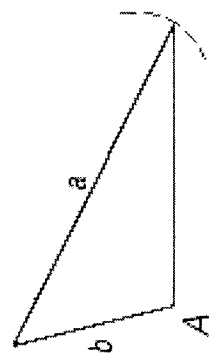


$a \geq b \sin A$
one solution

A Is Right or Obtuse ($A \geq 90^\circ$).



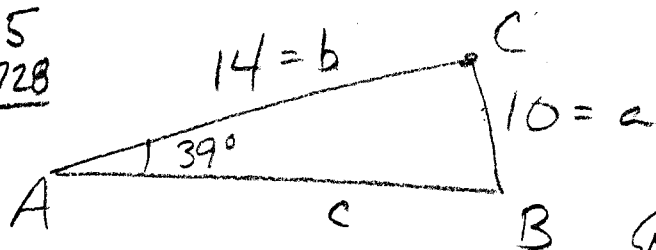
$a \leq b$
no solution



$a > b$
one solution

The Ambiguous Case of the Law of Sines = SSA ==> Use LOC and QE -- Mr.C.

EX 5
Pg 728



SSA
↑↑
TWO SIDES ⇒ LOC

NEED COSA FORM

LOC ⇒ KNOW a, b, COSA ONLY C IS UNKNOWN

⇒ "3A4" } $a^2 = b^2 + c^2 - 2bc \cos A$

$$10^2 = 14^2 + c^2 - 2(14)c(\cos 39)$$

$$0 = 96 + c^2 - 28(.7771)c$$

$$c^2 - 21.76c + 96 = 0$$

a = 1 $b^2 - 4ac$

b = -21.76 $(-21.76)^2 - 4(1)(96)$

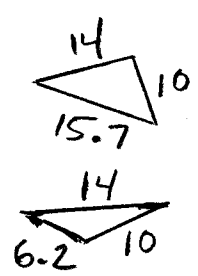
c = 96 $473.5 - 384 = 89.5 = d$

$$c = \frac{-b \pm \sqrt{d}}{2a} = \frac{21.76 \pm \sqrt{89.5}}{2(1)}$$

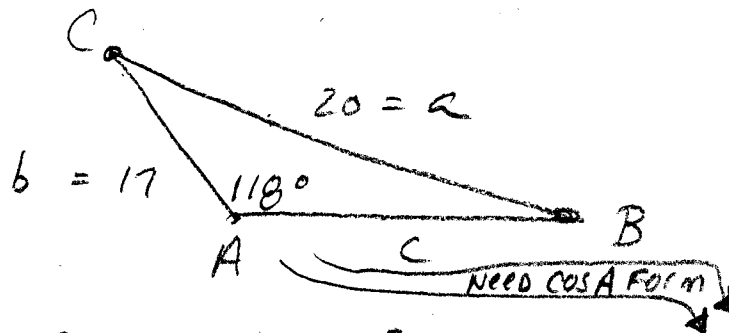
$$c = \frac{21.76 \pm 9.46}{2}$$

$$c \approx \{15.7, 6.2\}$$

TWO SOLUTIONS



Ex 3
Pg 727



SSA
Two Sides LOC

$$LOC \Rightarrow a^2 = b^2 + c^2 - 2bc \cos A$$

$$20^2 = 17^2 + c^2 - 2(17)c (\cos 118^\circ)$$

$$400 = 289 + c^2 - 34(-.4695)c$$

$$0 = -111 + c^2 + 15.963c$$

$$OR \quad c^2 + 15.963c - 111 = 0$$

$$a = 1 \quad b^2 - 4ac$$

$$b = 15.963$$

$$c = -111$$

$$(15.963)^2 - 4(1)(-111)$$

$$254.82 + 444 = 698.82 = d$$

$$c = \frac{-b \pm \sqrt{d}}{2a} = \frac{-15.963 \pm \sqrt{698.82}}{2(1)}$$

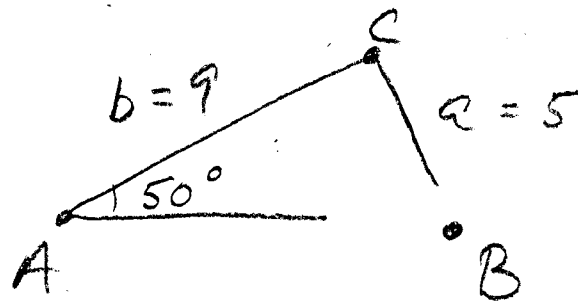
$$c = \frac{-15.963 \pm 26.44}{2}$$

$$c = 5.23 \text{ AND } -21.2 \text{ discard}$$

$$c = 5.23$$

ONE SOLUTION

EX 4
PG 728



5
KNOWN ANGLE
OPPOSITE SHORT SIDE

SSA

2, 1, or 0 solutions

Know $b, a, \cos 50 = \cos A$ Need $\cos A$ Form

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$5^2 = 9^2 + c^2 - 2(9)c(\cos 50)$$

$$0 = 56 + c^2 - 18(.6428)c$$

$$0 = c^2 - 11.57c + 56$$

$$a = 1$$

$$b^2 - 4ac$$

$$b = -11.57$$

$$(-11.57)^2 - 4(1)(56)$$

$$c = 56$$

$$133.87 - 224 = -90.13 = d$$

d is negative

\therefore No Real Solutions

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Summary: ASA } LAW OF SINES
AAS }

SAS } LAW OF COSINES

SSS } LAW OF COSINES, solve for
largest angle first

* SSA } LAW OF COSINES \Rightarrow
QUADRATIC EQUATION w/ 0, 1, 2 SOLUTIONS.
*(IF KNOW ANGLE IS OPPOSITE SHORT SIDE)

• Homework: Pg 736 # 12, 13, 14

USE: \uparrow \uparrow \uparrow
LoS LoC LoC
 \downarrow
 QUADRATIC,
 SOLVE BOTH Δ
